REMARKS

Claims pending in the instant application are numbered 1-23. Claims 1-23 presently stand rejected. The specification, Figures 1, 2, 5, 6 and 7, and claims 1 and 15 have been amended. No new matter has been added. The Applicants respectfully request that the instant application be reconsidered in view of the amendments and following remarks.

Drawing Objections

In the February 2, 2000 Office Action, it is brought to the Applicants' attention that the corrections to Figures 1, 2, 5, 6 and 7 required correction to correct minor matters of form. Accordingly, the Applicants resubmit the corrected drawings herewith as requested in the February 2, 2000 Office Action. No new matter has been added as all drawing corrections are supported by the written description, claims and/or drawings as originally filed.

Specification Objections

In the February 2, 2000 Office Action, it is brought to the Applicants' attention that the corrections to pages 3 and 9 required correction to correct minor matters of form. In addition, the it is brought to the Applicants' attention that proper antecedent basis for claimed subject matter is not provided. Accordingly, the Applicants have amended the specification to cure these minor formalities. No new matter has been added as all specification corrections are supported by the written description, claims and/or drawings as originally filed.

35 U.S.C. § 112 Rejections

In the February 2, 2000 Office Action, claims 1-23 are rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which as not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, has possession of the claimed invention. In particular, the February 2, 2000 Office Action states that specification fails to adequately disclose how light from a light source is reflected off a cantilever mounted reflective structure in a direction back towards the light source.

The Applicants respectfully direct attention to the example embodiment illustrated in Figure 6 as originally filed. As shown in Figure 6 as originally filed, light 323 is directed substantially through free space to reflective structure 603 in the illustrated embodiment. As shown in Figure 6 as originally filed, reflective structure 603 includes a skewed reflective surface relative to a surface of cantilever 315 such that light 323 is reflected from reflective structure 603 substantially through free space.

The Applicants respectfully direct attention to an additional embodiment illustrated in Figure 7 as originally filed. As shown in Figure 7 as originally filed, light 323 is directed substantially through free space to reflective structure 703 in the illustrated embodiment. As shown in Figure 7 and described on page 16, lines 17-19, as originally filed, reflective structure 703 in one embodiment includes a diffraction grating. Accordingly the light 323 that is reflected from reflective structure 703 substantially through free space includes N orders of diffraction of reflected light.

The Applicants have amended the specification at pages 13 and 14 to help clarify the present invention. No new matter has been added as all specification and drawing amendments are supported by the written description, claims and/or drawings, as

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originally filed and as discussed above. The Applicants respectfully submit that the disclosure provided by the Applicants' written description and drawings clearly convey to those skilled in the art having the benefit of the Applicants' written description and drawings would appreciate that the Applicants had possession of the claimed invention at the time the present application was originally filed. Accordingly, the Applicants respectfully request that the instant 112 rejection be withdrawn.

35 U.S.C. § 102 and 103 Rejections

In the February 2, 2000 Office Action, claims 1-23 are rejected under 35 U.S.C. § 102(b) as being fully anticipated by Kajimura, US Patent Number 5,394,741, or in the alternative under 35 U.S.C. § 103(a) as obvious over Kajimura.

Example claim 1 as presently amended expressly recites a scanning force microscope probe including "a reflective structure included on the cantilever such that at least a portion of light that is directed substantially through free space to the cantilever in a first direction having a directional component from the first end to the second end is reflected from the reflective structure substantially through free space in a second direction having a directional component from the second end to the first end." Therefore, the light is directed to and from the expressly claimed reflective structure substantially through free space.

Kajimura is directed to an atomic probe microscope including a cantilever having a probe on one side of the end portion and a reflection element on the opposite side. In the various structures disclosed in Kajimura, light is directed to the reflective element and is reflected. However, Kajimura fails to disclose, teach or fairly suggest that the light is directed to the reflective element in a first direction having a directional component from the first end to the second end of the cantilever substantially through free space and that

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the light is reflected from the reflective element in a second direction having a directional component from the second end to the first end of the cantilever substantially through free space.

Regarding the particular structure shown in Figure 10 of Kajimura, which is referenced in the February 2, 2001 office action, a cantilever 16 is shown including a waveguide 46 through which light from a laser 24 is guided. (Kajimura, col. 8, lines 55-56). Kajimura states that light from the laser 24 travels through the waveguide 46 to reach the reach the reflection element 48. (Kajimura, col. 8, lines 62-64). Reflected light then travels from reflection element 48 back through waveguide 46 to a reflection cleavage plane 32 for detection by photodetector 34. (Kajimura, col. 8, line 67, to col. 9, line 6). Therefore, Kajimura discloses light traveling to and from reflection element 48 substantially through waveguide 46, which is included in cantilever 16. Kajimura fails to disclose, teach or fairly suggest that light is directed to and from the reflection element 48 substantially through free space having the expressly recited directional components of the presently claimed invention.

Accordingly, since at least one or more expressly recited elements of the presently claimed invention are not disclosed, taught or fairly suggested in the prior art references of record, the Applicants respectfully submit that presently claimed invention is neither anticipated nor rendered obvious in view of Kajimura. Therefore, the Applicants respectfully request that the instant section 102 and 103 rejections be withdrawn and that the presently claimed invention is in condition for allowance.

Attached hereto is a marked up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

The Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Charge Deposit Account

Please charge our Deposit Account No. 02-2666 for any additional fee due in this matter.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Date: 4-30-01

James Y. Go
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VERSION WITH MARKINGS TO SHOW CHANGES MADE:

IN THE SPECIFICATION

Paragraph beginning at line 1 of page 3 has been amended as follows:

Another disadvantage with the present day scanning force microscope 101 is that it is difficult to measure simultaneously two or more nodes in close proximity on the surface 118 of sample 117. In particular, since mirror 111 is positioned above cantilever 115 and [portruding]protrudes beyond the free end of cantilever 115 as shown in Figure 1, it is difficult to position more than one scanning force microscope to measure multiple signal waveforms in a small area of surface 118. More generally, in present day scanning probe microscopes employing optical deflection sensors, it is difficult to position two or more probes in close proximity due to the protrusion of the optical path used to sense cantilever motion beyond the end of the cantilever.

Paragraph beginning at line 1 of page 9 has been amended as follows:

In one embodiment, an optical source 303 generates a light 323, which is directed through beam splitter 307, lens 309 and then is deflected off mirror 311. As shown in the embodiment of Figure 3, light 323 is directed through free space to cantilever 315 of probe 313. In one embodiment, light 323 is directed from optical source 303 in a direction having a directional component from the fixed end to the free end of the cantilever 315. In one embodiment, optical source 303 is independent of cantilever 315 and incident light 323 to cantilever 315 is therefore independent of mechanical motion of cantilever 315. However, the mechanical motion of cantilever 315 is detected with

detector 305 through reflected light 323, which in one embodiment is reflected through free space from cantilever 315. In one embodiment, light 323 is reflected off cantilever 315 in a direction having a directional component from the free end to the fixed end of cantilever 315. In one embodiment, light 323 is reflected back to mirror 311 through lens [319]309 and off beam splitter 307 into detector 305.

Paragraph beginning at line 7 of page 13 has been amended as follows:

Figure 6 is an illustration showing greater detail of one embodiment of a probe 313 in accordance with the teachings of the present invention. As shown in Figure 6, probe 313 includes a cantilever 315 attached at a fixed end to a chip 601. In one embodiment, the other end of cantilever 315 is a free end. In one embodiment, cantilever 315 includes silicon. In one embodiment, cantilever 315 includes silicon nitride. In one embodiment, a reflective structure 603 is included on the back side of cantilever 315. As shown in Figure 6, one embodiment of reflective structure 603 includes a skewed reflective surface relative to a surface of cantilever 315. In one embodiment, a tip 605 is included on the front side of cantilever 315. In another embodiment, tip 605 is not included on the front side of cantilever 315. In yet another embodiment, cantilever 315 is transparent to light 323 and a reflective structure [603]604 may therefore be disposed on the front side of cantilever 315.

Paragraph beginning at line 8 of page 14 has been amended as follows:

As shown in Figure 6, light 323 in one embodiment is reflected through free space

from a skewed reflective surface of reflective structure 603. In one embodiment, light 323 is reflected from cantilever 315 in a direction having a directional component from the free end to the fixed end of cantilever 315. In one embodiment, light 323 is reflected back in substantially the opposite direction from which light 323 originated. In another embodiment, light 323 is reflected back in a different direction, but still reflected from cantilever 315 in a direction having a directional component from the free end to the fixed end of cantilever 315. An example of this embodiment is illustrated in Figure 4.

Paragraph beginning at line 18 of page 14 has been amended as follows:

Figure 7 is an illustration of another embodiment of a probe 713 in accordance with the teachings of the present invention. Probe 713 of Figure 7 includes a cantilever 315 attached at a fixed end to a chip 601. In one embodiment, the other end of cantilever 315 is a free end. In one embodiment, a reflective structure 703 is included on the back side of cantilever 315. In one embodiment, a tip 605 is included on the front side of cantilever 315. In another embodiment, tip 605 is not included on the front side of cantilever 315. In yet another embodiment, cantilever 315 is transparent to light 323 and a reflective structure [703]704 may therefore be disposed on the front side of cantilever 315.

IN THE CLAIMS

Claims 1 and 15 have been amended as follows:

1. (Amended) A scanning force microscope probe, comprising:

a cantilever having a first end and a second end; and

a reflective structure included on the cantilever such that at least a portion of light that is directed substantially through free space to the cantilever in a first direction having a directional component from the first end to the second end is reflected from the reflective structure substantially through free space in a second direction having a directional component from the second end to the first end.

15. (Amended) A method of detecting motion of a scanning force microscope probe cantilever, the cantilever having a first end and a second end, the method comprising:

directing light to the cantilever in a first direction substantially through free space having a directional component from the first end to the second end of the cantilever;

reflecting at least a portion of the light from the cantilever in a second direction substantially through free space having a directional component from the second end to the first end of the cantilever; and

receiving the portion of the light reflected from the cantilever to detect motion of the cantilever.

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